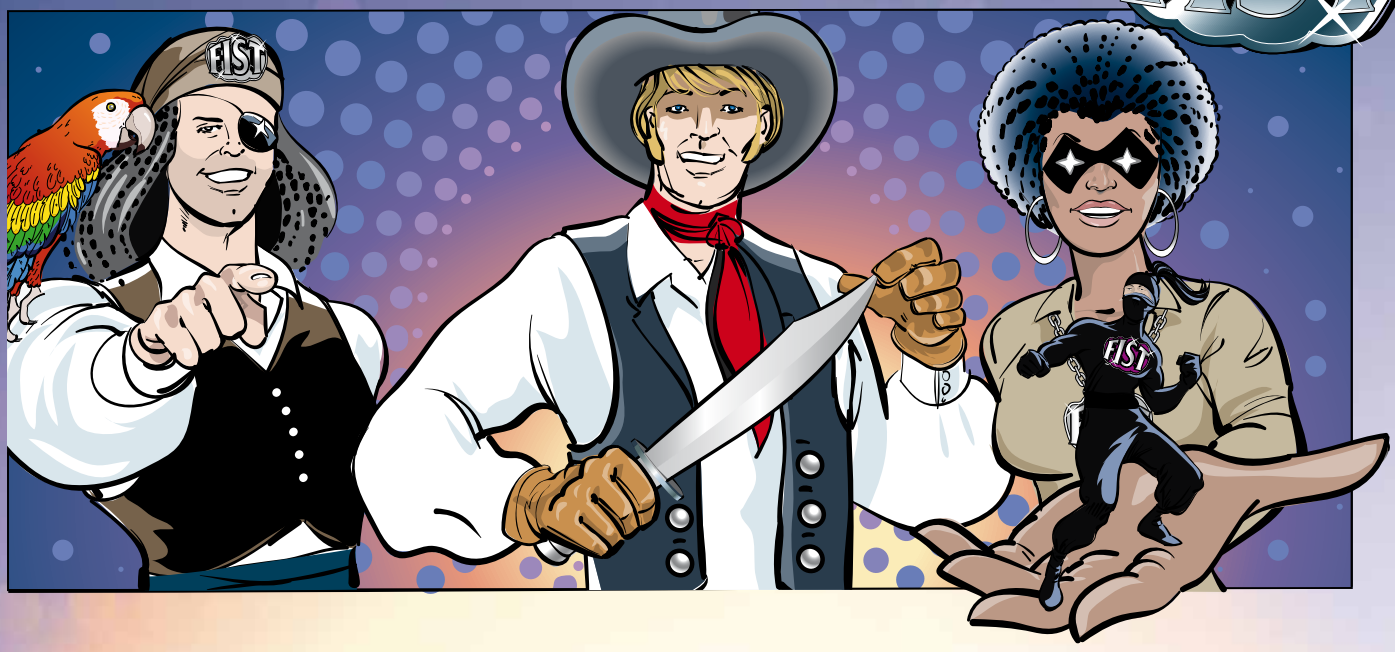
# FAST, INEXPENSIVE, SIMPLE, TINY FIST




# FIST at 5

## Looking Back, Looking Ahead

*Lt. Col. Dan Ward, USAF*

The March 2006 issue of *Defense AT&L* introduced a small group of superheroes called the FIST (Fast, Inexpensive, Simple, Tiny) team. While the concept had been around for a while, this was the first time the FIST acronym appeared in print. The next issue (May–June 2006) contained an article titled *FIST, Part 5,* which laid out the concept in more detail and tied together its previously unconnected elements.

In the 5 years since, FIST has made frequent appearances in this magazine (including two more comics), was introduced to dozens of classes at Defense Acquisition University and the Air Force Institute of Technology (AFIT), was researched at AFIT and MIT, and even earned a handful of mentions on *Wired* magazine's Danger Room blog and the National Defense Industrial Association's *National Defense* magazine.

Academic references and positive media reports are great as far as they go, but adoption by practitioners in the field was always the objective. I'm happy to report FIST has been implemented by a small-but-growing group of professionals across the Department of Defense (DoD), Department of Homeland Security, and industry. It's been applied

Illustrations by Jim Elmore

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to a wide range of acquisition programs, from space hardware to intel systems to software to aircraft. The initial results are encouraging.

Now that FIST has been around the block a few times, I want to take a moment and reflect on 5 years of programs, experiments, and experiences. But first, let's set a foundation for any newcomers.

## What Is FIST?

The past 5 years have seen FIST described as a set of values, a method, and a design approach, to name a few labels. Lately I've taken to describing FIST as "a decision-making framework." That is, FIST aims to help people make good decisions by guiding them toward opportunities to streamline, accelerate, and simplify various dimensions of the program. In practical terms this translates to simplified organizations, processes, architectures, and briefing charts—the specifics of which are unfortunately beyond the scope of a magazine article.

FIST also means rigorously enforced schedules and budgets, pared down requirement sets, and a disciplined focus on delivering capabilities on operationally relevant timelines. Or, as Department of Defense Instruction (DoDI) 5000.2 puts it, "The objective is to balance needs and available capability with resources, and to put capability into the hands of the user quickly." FIST offers concrete guidelines to help acquirers achieve that objective.

While FIST is entirely consistent with Department of Defense Instruction DoDI 5000.2, it is not exactly common sense. In many cases it is counter-intuitive and goes against conventional wisdom. That is, while the acquisition community often tries to solve problems by adding time, money, or people, FIST points to the wisdom of Fred Brooks' *Mythical Man Month:* "Adding people to a late project makes it later." Similarly, FIST argues that restructuring programs by extending the schedule tends to have a negative impact rather than a positive one. Instead, FIST calls for restraint and suggests using fixed schedules and floating requirements instead of the all-too-common inverse.

Conventional wisdom also tends to view complexity as a sign of sophistication. Program managers have been known to brag about how complex their systems are, but FIST posits that complexity is a sign of an *immature* design, not something to praise or pursue. True sophistication is found in simplicity. This is as true for PowerPoint charts and meeting minutes as for system architectures.

Along with overvaluing complexity, a desire for perfection and completeness often drives acquirers to produce documents that are unnecessarily unwieldy (and expensive). The FIST approach prefers the F-16 Falcon's 25-page Request for Proposal over the 26-page recipe for military brownies.

## But Does It Work?

I have a big collection of examples that show FIST in action, but let me group them into two categories. The smaller category consists of programs that explicitly use the term FIST as their guiding principles. The other includes programs that fit the model without necessarily using the term. These programs used simplicity, budgetary restraint, and schedule restraint to deliver amazing capabilities.

I don't want to give the impression the second group learned about FIST from the pages of this magazine. I just point to them as examples that fit the model. In many of the cases that follow, their stories helped develop and mature the FIST approach. If anything, they get credit for FIST and not the other way around.

### *Harvest Hawk*

The Marine Corps Harvest Hawk "instant gunship" went from inception to first strike in a mere 19 months, launching a Hellfire missile against the Taliban in November 2010. The key was clever reuse of existing airframes and munitions. You see, a

Harvest Hawk is basically a weaponized KC-130J tanker, retrofitted with missiles and sensors. An optional 30mm cannon is also available, but for the most part, the missiles pack more than enough punch.

With Harvest Hawk, the Marines clearly placed a premium on simplicity, thrift, speed, and restraint. This reversible mod costs far less than a new AC-130 and provides a simpler logistics footprint than a mixed fleet of KCs and ACs. The decision to make the cannon optional is a concrete example of engineering restraint and operational clarity—precisely the type of decisions FIST encourages.

### *Project Liberty*

There's a lot we could say about the Air Force's award-winning MC-12W Project Liberty ISR (Intelligence, Surveillance, and Reconnaissance) aircraft. I could share all sorts of data about how program leaders used short schedules, tight budgets, simple technologies, and strong teamwork to deliver a critical warfighting capability. But for brevity's sake, here's a thumbnail timeline: The program kicked off in July 2008, awarded a contract in November 2008, delivered the first aircraft in March 2009, and deployed in April 2009. Rather than elaborate, I'll turn the podium over to Secretary of Defense Robert Gates, who told the MC-12 team: "Your work proves what industry and the military can accomplish together. And it reminds us that new platforms can be developed, built, and deployed in a short period of time—and the best solution isn't always the fanciest or the most expensive." 'Nuff said!

### *Condor Cluster*

FIST's relevance is not limited to aircraft. In December 2010, the Air Force Research Lab cut the ribbon on a supercomputer named the Condor Cluster. Operating at a blistering 500 TFLOPS (**T**era **FL**oating Point **Op**erations per **S**econd), it is the fastest interactive supercomputer in the entire DoD. Remarkably, the Condor Cluster was developed for one-tenth the price of a typical supercomputer, and it uses less than one-tenth the power of comparable systems, reducing both its operating costs and its carbon footprint. How did the wizards at Air Force Research Laboratory nail such an epic win? They used 1,760 Sony PS3s running Linux, an open-source server operating system that also runs the 10 fastest supercomputers in the world. As with the first two examples, the Condor Cluster shows great things can be "developed, built, and deployed in a short period of time," without busting the bank. The key is simplicity, frugality, imagination, and a preference for speed.

I'm tempted to dedicate this whole article to regaling you with longer, more detailed stories about recent FIST programs. I could share several firsthand examples as well as stories from my colleagues across the defense acquisition community. However, we have other topics to discuss, so I'll limit myself to these three snapshots.

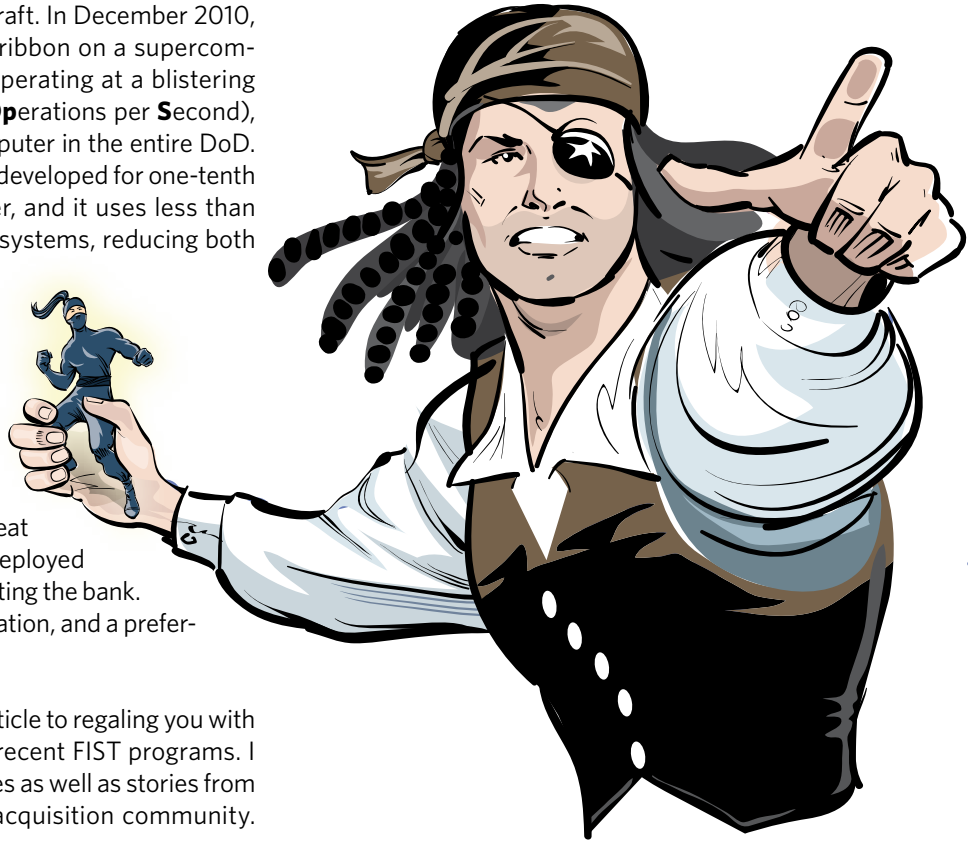
## Tools, Principles, and Practices

FIST is not just a collection of ideas. It also provides practical tools for program managers, engineers, and other acquisition professionals.

The Simplicity Cycle is one of the core assessment tools in the FIST toolbox. First introduced in the November–December 2005 issue of *Defense AT&L*, the book version was published in 2007 and is available as a free eBook at Lulu.com. This little diagram highlights the impact of complexity and helps people understand and communicate the value of a design change. Don't miss Dr. Chet Richards' review in the November–December 2007 issue of *Defense AT&L*.

The Simplicity Cycle was one of the first items in the FIST toolbox, but the collection grew and matured significantly in the past 5 years. In addition to the principles and practices contained in *The FIST Manifesto* (see the November–December 2010 issue), FIST practitioners are now pointed to a wide variety of other techniques, processes, and approaches, many of which are borrowed from industry.

The family of Agile methodologies (i.e., Scrum, Extreme Programming, etc.) are laser-focused on reducing the cost, duration, and complexity of system development and are therefore key components of the toolbox. To help show the way, in April 2010 Carnegie-Mellon published an insightful report titled



*Considerations for Using Agile in DoD Acquisitions*. It's available online for your reading pleasure—ask Google for the link.

Toyota's much-imitated Lean approach contributes an impressive set of tools designed to reduce waste and increase effectiveness. These are keys to making things fast, inexpensive, simple, and tiny. Bill Peterson at the University of Tennessee is doing some fantastic work on applying Lean to business processes, with specific emphasis on the acquisition community (learn more at leanbusiness.utk.edu).

The late Genrich Altshuller's Theory of Innovative Problem Solving (TRIZ) is a master's class in design, with a strong emphasis on simplicity and speed. Altshuller's TRIZ contradiction matrix and 40 principles are powerful, elegant, and efficient. They should be required reading across the acquisition community (learn more at triz-journal.com).

Finally, there is the Modular Open Systems Approach (a.k.a. MOSA). This is not only a well-documented, proven method for reducing complexity, cost, and delays, it's specifically called out in DoDI 5000.2: "Program managers shall employ MOSA to design for affordable change, enable evolutionary acquisition, and rapidly field affordable systems that are interoperable in the joint battlespace." The Open Systems Joint Task Force has a big stack of resources, available at www.acq.osd.mil/osjtf/index.html.

These powerful tools are key to implementing FIST, but they are not shortcuts. As with any tool, expertise comes from practice. Truly mastering Agile, Lean, TRIZ, or MOSA requires concentrated study, experimentation, and dedication. If you're looking for an easy way out, you won't find it here. This is not easy, but it is also not impossible.

Now may be a good point to mention the *no monopoly, no guarantee* caveat. While FIST is a productive, constructive set of guidelines and a powerful toolset, it is not the only way to do good work, nor does it promise positive outcomes. It is entirely possible to use FIST and fail. Of course, these caveats apply to any approach, but I mention them here in the interest of full disclosure.

Having recapped the evolution of FIST, shared some success stories, and highlighted a few tools, I'd now like to address a topic that got little attention in the early days of FIST: the contractors who are such a critical part of the defense acquisition community.

## A Brief Comment to Industry

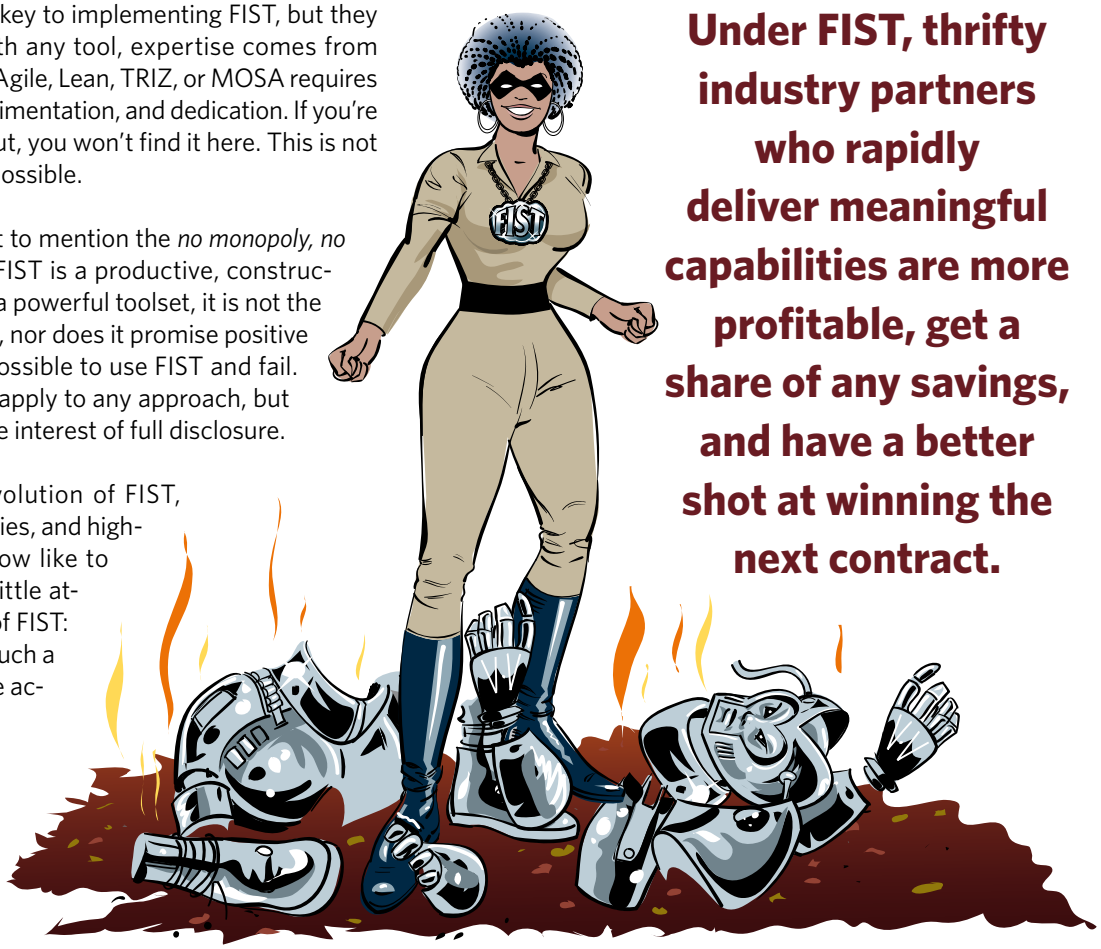
If I could only say one thing to our industry partners, it's this: *I want you to succeed*. I want you to be profitable, creative, efficient, robust, and world-class. In fact, I need you to be these things, because I can't do my job without you.

Even though government and contractors often have an adversarial relationship, the truth is we're not competitors. We're partners. I can't succeed unless you also succeed. So when I talk about FIST, I don't want you to get nervous. This approach has a lot of benefits for you, starting with profitability.

Let me say it again—I want you to be profitable. I want you to succeed in business because I need the products and services you provide. This is not at all inconsistent with the "Inexpensive" piece of FIST.

Someone recently pointed out to me that success is more profitable than failure. It's not a deep and profound observation. It's just one of those obvious, why-didn't-I-think-of-that sort of things. And when it comes to success, a significant amount of data indicates FIST has a higher success rate than the big, expensive, slow approach.

The notional graph shown here is based on a conglomerated set of data, primarily from The Standish Group. What it shows is that the measured success rate for development projects (defined as delivering on time, on budget, with all

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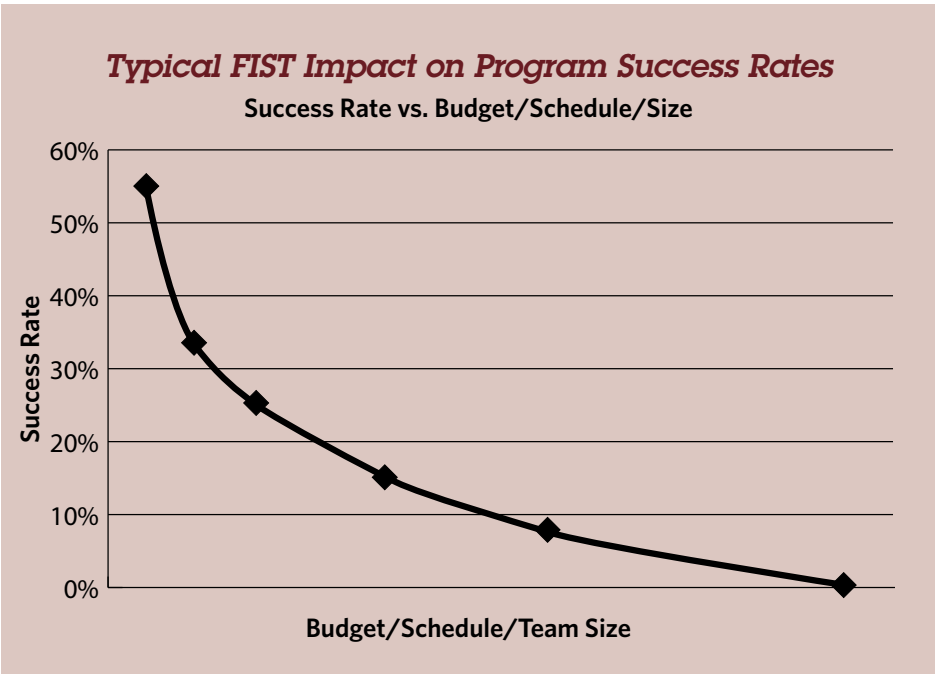
the features and functions as originally envisioned) follows this kind of curve, regardless of whether the x-axis represents money, time, or people. In each case, less is more. (I could have provided specific graphs with actual data for each dimension, but that would have been redundant.)




This graph tells us the FIST approach is likely to have a positive impact on your success rate. It does not say FIST never fails—check out *On Failure* in the May–June 2009 issue. However, it does suggest FIST fails less often.

Note that on the question of team size, we're talking about people-per-project, not people-per-organization. A large company might have a bunch of small projects at once, while a small company may only have a few. But if we scale things well, both large and small businesses will be able to contribute to the fight, and that's a win for everyone.

And at the risk of speaking out of school, I'd like to respectfully suggest it's better to have a profitable $10 million program than a $100 million program that doesn't make any money. Now, I'm not a businessman, so maybe that's a question of taste. Perhaps I'm showing unpardonable ignorance on the topic and if so, I'm sure my better informed readers will let me know. All I know is an expensive, unprofitable program sounds like a white elephant to me.

A few final comments before we move to the next topic: Yes, FIST is all about living within tight constraints of time and money. But it's also about delivering products. Speaking as a customer, I prefer to work with companies that deliver, preferably in my lifetime. Implementing the FIST approach leads to frequent delivery, which combined with a higher success rate, means more business—and more profits—for you.

FIST is also about rewarding and encouraging underruns, and encourages sharing any savings with industry. Many contract strategies can provide this sort of incentive—strategies that are well-documented and approved within the current policy and regulatory environment. The bottom line: Under FIST, thrifty industry partners who rapidly deliver meaningful capabilities are more profitable, get a share of any savings, and have a better shot at winning the next contract.

## The Next 5 Years

What's next? Hopefully, more people will adopt FIST and use the toolset to reduce the cost, delay, and complexity of acquisitions. I'd love to see FIST become the preferred approach rather than a relatively rare exception.

For my Air Force colleagues, that might mean using Air Force Instruction 63-114, *Quick Reaction Capability Process*, as the first choice instead of a last resort. Other Services and Defense Agencies have similar options available to them. The point is we don't need a bunch of new policies and procedures. It is enough to simply shift the default toward existing methods and learn to use the tools all around us.

Along with wider adoption, I look forward to deeper development of FIST. Discussions are already ongoing with two universities to do additional research in this area. A clear, simple set of FIST-oriented metrics would help influence behavior at the enterprise level, so that's one possible research topic. And of course, as more PMs get more experience with FIST, I hope they'll share their insights with the rest of us.

What will the acquisition environment look like 5 years from now? If history is any indication, it will probably look a lot like it does today. But maybe not. Maybe things will change. Maybe a critical mass of acquirers will adopt the FIST approach and master these tools, reducing the cost, delay, and complexity of defense acquisitions. Maybe you'll be one of them.

I hope so.

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